Introductory Remarks to Symposium 20

Common ground plan of the insect brain architecture

Kei Ito and Ansgar Büschges, Köln

A brain features a complex network of neuronal fibres. They form many substructures each of which is supposed to handle certain aspects of information processing and to work synergistically to achieve neuronal computation. Understanding how they are organized and working together is one of the fundamental questions of neuroscience. Identification of such substructures, however, is not a trivial problem. Brain of each animal species is a consequence of elaborated specialisation through many years of evolution. A characteristic feature found in a brain of one species may or may not be a common general feature across taxa. In this respect, it should be important and effective to perform systematic comparison of the brains of various species that belong to certain evolutionary clade. Insect brain is a suitable model system for such venture. Compared to the large brain of mammals, insect brains are smaller and relatively simpler, enabling, in principle, comprehensive comparison of the entire brain architecture. Reflecting four to five hundred million years of evolution, their brains show large diversification, yet certain characteristics appear to be shared. Comparison of their brains according to the evolutionary clades should provide insights on how the brain architecture is organized and evolved. During the past 200 years, scientists have analysed the brains of diverse insect species, but interspecies comparison tend to have remained superficial, focusing only on prominent structures that are easily recognizable by classic histological methods. However, recent advances in molecular, physiological and imaging neurobiology have provided various new tools for analysing the brain. In addition, a systematic nomenclature for the insect brain was proposed in 2014 to partition the entire brain into subregions in a reasonable way and provide common names to them. These advances should promote comparative analysis as well as communication between scientists who work on different insect species. This symposium presents recent advances on the understanding of the brains of various insects, and discusses how knowledge obtained by the study of one species can be compared and extended across taxa. Through this symposium we intend to provide perspectives for organizing broad collaboration of scientists to understand the common ground plan and building principles of the insect brain neuronal network.

Symposium 20

Friday, March 24, 2017
11:30 – 13:30, Lecture Hall 105

Chairs: *Kei Ito and Ansgar Büschges, Köln*

11:30 **Opening Remarks**

11:35 Kei Ito, Köln
HIGH-THROUGHPUT SYSTEMATIC IDENTIFICATION OF NOVEL NEURONS IN THE *DROSOPHILA* BRAIN AS A REFERENCE FOR COMPARATIVE ANALYSIS (S20-1)

12:00 Frank K. Schubert, Würzburg
SINGLE CELL MORPHOLOGY OF THE LATERAL CLOCK NEURONS IN DROSOPHILA MELANOGASTER (S20-2)

12:10 Keram Pfeiffer, Marburg
COMPARISON OF THE SKY-COMPASS PATHWAY IN DIFFERENT INSECT SPECIES (S20-3)

12:35 Wolfgang Rössler, Würzburg
EVOLUTION OF A SOCIAL INSECT BRAIN – INSIGHTS FROM COMPARATIVE STUDIES (S20-4)

13:00 Nicholas Strausfeld, Tuscon, USA
GENEALOGICAL CORRESPONDENCE OF BRAIN CENTERS ACROSS PANCRUSTACEA (S20-5)

13:25 **Concluding Remarks**